Claims

1. A broadband laser source comprising:

a resonant cavity containing a medium which emits optical energy in a continuum of wavelengths in response to application of pump energy to the medium;

a source of pump energy for producing said optical energy;

a frequency shifter within the resonant cavity; and

a tuneable spectral filter within the resonant cavity,

and the apparatus being such that in use the tuneable spectral filter has a peak wavelength which is repeatedly swept in a substantially resonant fashion over a wavelength range equal to, or a fraction of, a linewidth of the broadband source such that the rate of change of the peak wavelength of the tuneable spectral filter is substantially equal to the rate of change of the frequency of the optical energy as it is frequency shifted within the resonant cavity by the frequency shifter.

2. A broadband laser source according to claim 1 in which the tuneable spectral filter and the frequency shifter are embodied in an acousto-optic tuneable filter.

3. A broadband laser source according to claim 1 in which the resonant cavity is a ring structure which contains a rare-earth doped single-mode optical fibre, an optical isolator, an input fibre coupler for coupling the pump energy into the resonant cavity, and an output fibre coupler through which broadband laser light exits the resonant cavity.

4. A broadband laser source according to claim 1 in which the resonant cavity is a unidirectional laser structure which contains a rare-earth doped single-mode optical fibre, an optical isolator for ensuring unidirectional operation, an input fibre coupler for

coupling the pump energy into the resonant cavity, and an output fibre coupler through which broadband laser light exits the resonant cavity.

5. A broadband laser source according to claim 1 in which the resonant cavity is a fabry-perot structure.

6. A broadband laser source according to claim 1 and including an output coupling arrangement containing at least one narrow bandwidth optical filter.

7. A broadband laser source according to claim 1 in which the attenuation through the tuneable spectral filter is independently controlled as the peak wavelength of the tuneable spectral filter is swept.

8. A broadband laser source according to claim 7 in which control of the peak wavelength and attenuation are provided by control signals which are phase locked.

9. Sensing apparatus comprising an array of environmentally-sensitive narrow-band reflectors and a broadband laser source, in which the broadband laser source comprises:

a resonant cavity containing a medium which emits optical energy in a continuum of wavelengths in response to application of pump energy to the medium;

a source of pump energy for producing said optical energy;

a frequency shifter within the resonant cavity; and

a tuneable spectral filter within the resonant cavity,

and the apparatus being such that in use the tuneable spectral filter has a peak wavelength which is repeatedly swept in a substantially resonant fashion over a wavelength range equal to, or a fraction of, a linewidth of the broadband source such that the rate of change of the peak wavelength of the tuneable spectral filter is substantially

equal to the rate of change of the frequency of the optical energy as it is frequency shifted within the resonant cavity by the frequency shifter.

10. Sensing apparatus comprising at least one interferometer and a broadband laser source, in which the broadband laser source comprises:

a resonant cavity containing a medium which emits optical energy in a continuum of wavelengths in response to application of pump energy to the medium;

a source of pump energy for producing said optical energy;

a frequency shifter within the resonant cavity; and

a tuneable spectral filter within the resonant cavity,

and the apparatus being such that in use the tuneable spectral filter has a peak wavelength which is repeatedly swept in a substantially resonant fashion over a wavelength range equal to, or a fraction of, a linewidth of the broadband source such that the rate of change of the peak wavelength of the tuneable spectral filter is substantially equal to the rate of change of the frequency of the optical energy as it is frequency shifted within the resonant cavity by the frequency shifter.